

NON-PUBLIC?: N
ACCESSION #: 9003210274
LICENSEE EVENT REPORT (LER)

FACILITY NAME: VERMONT YANKEE NUCLEAR POWER STATION PAGE: 1
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DOCKET NUMBER: 05000271

TITLE: REACTOR SCRAM DUE TO TRANSIENT IN TURBINE CONTROL OIL
SYSTEM
CAUSED BY A FLOW IMBALANCE
EVENT DATE: 10/03/87 LER #: 87-015-01 REPORT DATE: 03/07/90

OTHER FACILITIES INVOLVED: NA DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 018

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: JAMES P. PELLETIER, PLANT MANAGER TELEPHONE: (802) 257-7711

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On 10/03/87 at 1356, with reactor at 18% power, while bringing the Turbine up to speed in preparation for placing the generator in service, a SCRAM occurred as a result of a turbine control valves' rapid opening and subsequent fast closure. The turbine control valves were not operating properly due to a suspected problem in the Turbine Control Oil System (TG*).

When oil pressure control switched from the Auxiliary Oil Pump to the Shaft Driven Oil Pump, an oil pressure transient caused the control valves to quickly open to the load limiter position. The subsequent short-term increase in steam flow through the Turbine was equal to approximately 50%, as determined by turbine first stage pressure. This rapid increase in turbine first stage pressure, above 30%, removed the automatic SCRAM bypass for the Turbine Control Valve Fast-Closure logic.

Since the Control Valve Fast-Closure SCRAM signal cannot be reset (armed) until oil pressure is being supplied by the shaft driven pump, this previously bypassed SCRAM signal caused the reactor to SCRAM at approximately 1356.

Vermont Yankee's investigation revealed that the pressure transient was caused by a flow imbalance in the Turbine Control Oil System. The turbine startup procedure was revised to ensure that the appropriate system balance is established during turbine startup. No similar events have been reported in the last 5 years.

*Energy Industry Identification System EIIS Identifier.

END OF ABSTRACT

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DESCRIPTION OF EVENTS

On 10/03/87 at 1356, while bringing the Turbine up to speed in preparation for placing the generator in service, a SCRAM occurred as a result of a turbine control valves' rapid opening and subsequent fast closure. The turbine control valves were not operating properly due to a suspected problem in the Turbine Control Oil System (TG). It appears that sufficient oil pressure was not available to position the control valves to the load limiter location.

Prior to this event, turbine control was being maintained by the load limiter, in preparation for placing the generator in service. With the reactor operating at approximately 18% power, turbine speed was being increased by raising the load limiter set point. Due to insufficient oil pressure in the turbine control system, the control valves were not open to the load limiter position. As the load limiter position was increased, a progressively larger span was occurring between the control valves actual position and the load limiter position. When turbine speed approached 1415 RPM, the Turbine Shaft Driven Oil Pump began to take over oil pressure control from the Auxiliary Oil Pump. The higher output pressure which was supplied by the Shaft Driven Oil Pump, resulted in the rapid opening of the turbine control valves to the load limiter position. The subsequent increase in steam flow through the turbine was equivalent to approximately 50% as determined by turbine first stage pressure. This rapid increase in turbine first stage pressure (above 30%), removed the automatic SCRAM bypass for the Turbine Control Valve Fast-Closure logic. Since the Control Valve Fast-Closure SCRAM signal cannot be reset (armed) until oil pressure is being supplied by the shaft driven pump, this previously bypassed SCRAM signal caused the reactor to SCRAM at approximately 1356.

By 1359, the SCRAM was reset and the transient stabilized.

The actual SCRAM occurred following this oil pressure change when the Control valves rapidly opened. This control valve opening increased turbine first stage pressure momentarily beyond 30% and input a previously bypassed SCRAM signal to the Reactor Protection System (JC) which resulted in a SCRAM at 1356.

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CAUSE OF EVENTS

Vermont Yankee's investigation revealed that the pressure transient was caused by a flow imbalance in the turbine control oil system. The procedure in effect at that time required the system to be balanced so that bearing header pressure was 30 psig. Although, the actual oil pressure was not recorded during the start-up, the start-up engineer did attribute the problem to insufficient header pressure and made the necessary adjustments. This low pressure positioned the control valves such that a sudden change in position was experienced when the oil supply shifted from the aux pump to the shaft driven pump. This sudden change in position caused this event.

* Energy Industry Identification System (EIIIS) Identifier

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ANALYSIS OF EVENTS

The events detailed in this report did not have adverse safety implications since;

1. When the Turbine Control Valves opened and permitted an increase in steam flow through the Turbine, the Reactor Protection System (JC) operated as designed, to protect the Reactor from this transient.
2. The short-term increase in steam flow through the Turbine caused a Reactor SCRAM before a significant increase in Reactor reactivity occurred.
3. Other Engineered Safeguard Systems (ESF) operated as designed.
4. Since the oil pressure problem existed in the start-up oil system, there were no problems related to the normal operation

of the turbine generator. In addition, there will be no change in the operational characteristics of the pressure control system and the bypass valves in the event of a need for emergency response to a load rejection or other plant transient.

CORRECTIVE ACTIONS

Immediate

The turbine vendor (GE) was utilized on-site to re-balance turbine oil pressure and assist in monitoring control valve performance during the following start-up to prevent a similar occurrence.

Subsequent

A comprehensive inspection of the aux oil pump was conducted which revealed no defective parts or out of specification clearances which could have affected oil system operation.

A comprehensive review of the turbine start-up procedure was performed by the turbine vendor (GE) and recommended changes were reviewed, modified, and implemented as deemed necessary.

One of the changes included establishing 30 psig (+ or -2 psig) as an acceptable range on the observed bearing header pressure. This change ensures that the appropriate system balance is established during turbine start-up. Since this change was made, there have been no similar problems with the turbine control oil system.

Additional Information

No similar events have been reported in the last 5 years.

*Energy Industry Identification System (EIIS) Identifier.

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VERMONT YANKEE NUCLEAR POWER CORPORATION

P. O. BOX 157
GOVERNOR HUNT ROAD
VERNON, VERMONT 05354

March 7, 1990
VYV# 90-061

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

REFERENCE: Operating License DPR-28
Docket No. 50-271
Reportable Occurrence No. LER 87-15

Dear Sirs:

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 87-15, Rev. 1. This supplement was prepared to provide an update on Vermont Yankee's evaluation of this event.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

James P. Pelletier
Plant Manager

cc: Regional Administrator
USNRC
Region I
475 Allendale Road
King of Prussia, PA 19406

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